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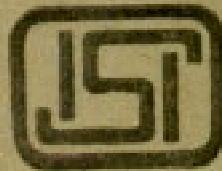


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*Indian Standard*  
METHOD FOR  
DETERMINING CASE DEPTH OF  
CARBURIZED STEEL BY FRACTURE TEST

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# Indian Standard

## METHOD FOR DETERMINING CASE DEPTH OF CARBURIZED STEEL BY FRACTURE TEST

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# Indian Standard

## METHOD FOR DETERMINING CASE DEPTH OF CARBURIZED STEEL BY FRACTURE TEST

### 0. FOREWORD

**0.1** This Indian Standard was adopted by the Indian Standards Institution on 25 May 1978, after the draft finalized by the Metallography and Heat Treatment Sectional Committee had been approved by the Structural and Metals Division Council.

**0.2** Carburizing of steel is generally carried out to obtain a hard, wear-resistant surface, and by choosing the base steels with relatively low carbon or suitable alloy content, adequate toughness in the case/core composite is ensured. Methods of measuring the case-depth in carburized steels has been specified in IS : 6416-1971\*. Recognizing the need for a quick shop-floor test, this standard has been prepared to provide a guide for procedure to be adopted for rapid determination of case-depth in carburized steels. The method described in this standard is in vogue as a useful tool for process control. However, this method shall not be used as a referee method.

**0.3** In reporting the results of a test made in accordance with this standard, if the final value, observed or calculated, is to be rounded off, it shall be done in accordance with IS : 2-1960†.

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### 1. SCOPE

**1.1** This standard prescribes a method of measuring case depth of carburized steel by fracture test for routine process control purposes.

### 2. TERMINOLOGY

**2.1** For the purpose of this standard, the definitions given in IS : 1956 (Part I)-1976‡ shall apply.

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\*Methods of measuring case depth of steel.

†Rules for rounding off numerical values (*revised*).

‡Glossary of terms relating to iron and steel: Part I General metallurgy, heat treatment and testing (*first revision*).

### 3. PROCEDURE

**3.1** Notched test bars ( notched up to about half of dia ) with a diameter of at least five times the desired case-depth, of adequate length and made from the same batch of steel as the articles to be carburized, should be carburized with the work. As soon as the time specified for carburizing has elapsed, one test bar shall be withdrawn from the carburizing medium, quenched in water and fractured by a hammer.

The fractured surface should be etched in a solution of 20 percent nitric acid in water for a time established to develop maximum contrast between the core and the case and then rinsed in water. The width of the case shall then be measured by means of a fine-point divider and a graduated scale.

**3.1.1** If required, a correlation may be established between the method described in 3.1 and the microscopic method of case-depth measurement as follows:

Pilot samples, selected from the batch of steel to be carburized, should be subjected to carburizing treatment. Samples should be quenched in water after withdrawing from the carburizing media. The quenched sample should be cut by a metallographic or other abrasive cut-off saw under coolant. The cut-off face, if necessary, should be polished on emery papers, and then etched in 3-5 percent Nital solution for 15-30 seconds. The carburized layer will become visible as greyish black skirt in the periphery. The width of the skirt should be measured with a graduated scale and a fine point divider and also by the microscopic method as described in IS : 6416-1971\*. The two sets of readings, should be compared for establishing the correlation between the two methods of measurement.

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\*Methods of measuring case depth of steel.